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SIGMA XI QUARTERLY

VOLUME II

DECEMBER, 1914

NUMBER 4



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EDITORIAL COMMITTEE

Edward Orton, Junior	Henry Baldwin Ward
Floyd Karker Richtmyer	Samuel Wendell Williston

Published by the

Society of the Sigma Xi

*Entered as Second-Class Matter at Champaign, Ill., Post Office.*

Annual Subscription 50 Cents

Single Number 15 Cents

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According to the Constitution the terms of all national officers end with the annual convention which comes at the close of the period for which they were elected. Nevertheless officers all serve until their successors are elected.

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## EDITORIAL COMMITTEE

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*Address all communications to the Managing Editor, Urbana, Ill.*

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## THE PHILADELPHIA CONVENTION

The annual convention will be held in Philadelphia, Pa., on Tuesday, December 29. This is in accordance with the action of the Society recorded in the Constitution, Appendix V.

It is proposed to have the Council and delegates from the various chapters lunch together at noon, and take up at once the business of the convention. Arrangements have been made for the Sigma Xi dinner that evening at six; it will be open to all members. At that time the chapter reports will be given and the general welfare of the Society discussed.

The dinner will be held in Houston Hall on the campus of the University and members should register for it on arrival in order that provision may be made for the proper number. Registration lists will be found at the headquarters of the American Association. Places can also be reserved if notice is sent by mail to the Secretary of Sigma Xi at that address. Early registration is advised to avoid trouble and disappointment.

## COMMITTEES AT WORK

An editor is sometimes forced to be an autocrat and under such circumstances may do the wrong thing. Perhaps this was the case when new names were given to two important committees that had reports in the last QUARTERLY. They were working on substantially the same problem in our organization though created for apparently different purposes. They had been given different and confusing designations at various times. To avoid further confusion the editor gave them colorless names: the Committee of Three and the Committee of Five. Their history is recorded in the editorial of the last issue of the QUARTERLY and may be summarized briefly here again for clearness.

At the Cleveland Convention it was voted

That the President be instructed to appoint a committee of three, one of whom shall be an engineer, whose duty it shall be to formulate an amendment to the Constitution defining the qualifications for membership and associate membership in the Society of the Sigma Xi;

That said committee shall submit its report, or reports, to the Council in such a way as it may prefer;

That the report, as modified or amended by the Council, shall be submitted to each chapter for approval before submission to the next convention of the Society for final action.

The President appointed S. W. Williston, Chicago, chairman; E. L. Nichols, Cornell; W. F. M. Goss,\* Illinois; as the committee to consider the qualifications for membership. (QUARTERLY, I:10).

This committee prepared a report which was printed with amendments and discussions (QUARTERLY, I:94) and presented to the Atlanta Convention. In the printed record (QUARTERLY, II:3) this is called the Committee on Constitutional Amendments; its membership was completed by the addition of President C. S. Howe and all amendments discussed in the Atlanta Convention were referred to it for further consideration and report. This is the Committee of Three whose report was noted editorially and printed in full in the last QUARTERLY (II:57).

At the Cleveland Convention certain amendments to the Constitution were proposed by the Minnesota Chapter.

After extended discussion of these amendments \* \* \* it was voted that the proposed amendments and suggestions of the President be referred to a committee of five who should formulate changes in the Constitution and report at the next convention.

The President appointed as members of the Committee on Amendments to the Constitution: H. S. Williams, Cornell, chairman; F. R. Watson, Illinois, secretary; J. McK. Cattell, Columbia, Julius Stieglitz, Chicago, H. T. Eddy, Minnesota. (QUARTERLY, I:12).

At the Atlanta Convention it made a report of progress and was continued; in the printed record it is designated as the Committee on the Admission of Chapters. This is the Committee of Five.

On September 25, there was held in New York City a meeting for the discussion of changes in the Constitution of the Society. Professors S. W. Williston, and E. L. Nichols, past presidents of Sigma Xi, Professor J. McK. Cattell, the present president, and Professor Julius Stieglitz, chairman of the Council, spent an entire day in discussing with great care the present Constitution of the Society and proposed changes.

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\*Dean Goss was unable to serve.



"The meeting in New York City should be regarded as an informal conference of those members of both committees who were able to come together—Professor H. S. Williams was in Cuba and both Dean Eddy and Professor Watson were unable to be present."

This is the meeting reported in the last number of the *QUARTERLY* (II:84). The full text of the amendments proposed by that committee was communicated to the corresponding secretary of each chapter and is printed in this number in order that the material may come before each active member of the Society. The amendments proposed at that time were presented to the Cornell Chapter, approved by that body, and are to come up for legal action at the coming convention. It should be noted that the recommendations of the report made by the Committee of Three were, with minor modifications, incorporated in the recommendations presented by the Committee of Five. It is also important to note that despite the independent organization of the two committees, two members of the former were by good luck and not at all by design made members of the latter so that the views of the earlier report were adequately presented in the discussion of the latter.

## THE PHILADELPHIA CONVENTION

For some years it has been felt by a number of those most intimately concerned with, and responsible for, the welfare of the Sigma Xi Society—such as the presidents and past-presidents—that important changes in its constitution were necessary in order to put the Society in a position to attain the place it should have in the development of the country in scientific matters. Such changes have been formulated in two reports which will come before the Philadelphia convention and make this the most important meeting that has been held by the Society in many years. One of these reports, prepared by a committee consisting of President Howe, the previous chairman of the Council, and Professors Williston and Nichols, Past-Presidents, was presented to the Chapters in the last number of the *QUARTERLY*. The present issue brings the second report of a joint committee including President Cattell, Past-Presidents Williams, Williston, Nichols and Eddy, the previous Chairman (President Howe), and the present chairman of the Council (the writer) and by Professor F. R. Watson, a member of the 1911 committee on the revision of the constitution. A number of members of this committee met in New York this summer and after a prolonged and thorough discussion framed the present recommenda-

tions. These have been assented to, with a few modifications, by the remaining members of the committee.

It is felt that the reasons for the changes recommended as thrashed out at the New York meeting in a discussion lasting some six hours, can better be stated in detail to the convention rather than presented in a long statement at this time. For this reason it is of special importance that chapters exercise the greatest care in the selection of their delegates and that they send these delegates *uninstructed* and *free to act* according to their best judgment after full and free discussion in conference. In order that Chapters may be ably represented and be quite free, in their selection, from the casual question of possible attendance or non-attendance of its representatives at the scientific gatherings occurring simultaneously in Philadelphia, each chapter should consider the advisability of paying the railway expenses of at least one of its delegates (as recommended in the revision of the constitution) in order to select its chief delegate with a special view toward assisting the convention to solve the serious problems facing it.

\* \*

While it is impossible and inadvisable to attempt to give in detail in the short space available the reasons for the proposed changes in the constitution, the writer, never having addressed the Chapters before in the *QUARTERLY*, considers the occasion an opportune one to explain briefly the main considerations which have swayed him personally in the issues before us at present. There are two fundamental questions before us—the membership question and the question of the business organization of the Society. Regarding the first question—about which so much has already been written—the situation in a nut-shell is simply this: research in pure and applied science in this country is no longer, as it was twenty-five years ago, a matter of *promise* and *interest* on the part of a large majority and of fruitfulness and accomplishment on the part of a few devotees. Research now numbers its active and productive workers by the thousand. We can well afford, under the changed conditions, to raise our standards for active membership from the doubtful criterion of “promise” to the safer test of accomplishment, and we must do so, if we wish to stand as a research society. It is characteristic too that these productive workers are found not only in large compact groups in the leading universities, colleges and technical schools, but they are found broadcast, in larger or smaller nuclei, on the staffs of a very large number of smaller but important colleges and technical schools.

All of these productive workers in investigation should be active members of the Sigma Xi Society, giving and receiving stimulation in the great cause of the Society. With the old, loose requirement of promise or of *mere interest in science* (this was given at the Washington meeting as a basis for election by a representative of a large and important chapter) as the sole requirement for active membership, the granting of charters for new chapters to nuclei of research men in colleges has become a very hazardous measure, which would threaten to smother the Society in unproductive, undergraduate membership. As a result not a single new charter has been granted to date to a collegiate institution during the four years of the chairmanship of the Council by the writer. By making active membership, *for the future*, conditional on actual accomplishment in investigation and by preserving by means of an associate membership its invaluable influence in stimulating promising undergraduates, the Society can safely and wisely see its way toward a broad nation-wide expansion of its chapters and influence, which it is not now in a position to secure. By raising its standards to this higher level, it will also take its place, at length, worthily side by side with other great learned societies, where accomplishment, not mere promise, is the criterion for membership. As a member of one of the fortunate institutions which has a large graduate school, I wish to emphasize that this new movement is primarily intended to clear the way for chapters at the large number of important institutions, which, not developed to the point of having large graduate schools, or any graduate schools at all, nevertheless have most important nuclei of investigators on their staffs, institutions which the Sigma Xi Society should aim to encourage and support in the fostering of original investigation by their members.

Concerning the second great question before us, the business organization of the Society, we find that this includes at present a threefold distribution of the responsibilities for action, the Council, the Chapters and the conventions. This makes action cumbersome, slow and unsatisfactory. Over ninety per cent of the work must now be done by way of conference by correspondence. There is never, in the work of the Council and of Chapters, a complete, effective and pointed exchange of views, as there is in the personal conferences at conventions. In these conventions all the chapters are on a basis of absolute equality. Placing all the power for action in the hands of conventions appears therefore to promise more expeditious, wiser and also somewhat more democratic action than is possible now. For the preparation of business for the con-

vention an executive committee, elected by the convention, is provided for. After years of experience on our Council, first as a member and for four years as its chairman, I am heartily in favor of its abolition and of the proposed new organization for the business management of the Society.

Whether the revision of the constitution in exactly the form proposed by your committees is ratified by the Philadelphia convention, is not the question of greatest moment before us: it is that Chapters should select their delegates to the coming convention so carefully that at the convention we may have the greatest measure of wisdom and talent in solving the questions which your committees have prepared for it, so that some solution of these questions be, at length, agreed upon.

JULIUS STIEGLITZ

Chicago, Nov. 13, 1914.



Professor A. S. Williams, founder and Past-President of the Sigma Xi Society, has commented as follows on the proposed revision of the Constitution as presented in this number of the *QUARTERLY*: "I have read the proposed revision over critically and am well pleased with the result. I believe it will give the elasticity needed to make it apply to the various types of men and also to any institutions to which we desire to extend it."

## TAKING INVENTORY

F. K. RICHTMYER, *Recording Secretary of the Cornell Chapter*

In a recent number of the *QUARTERLY*, attention was called to several matters of more or less general interest regarding which it seemed worth while to obtain information. Accordingly, under the date of October 31, 1914, the writer addressed the following circular letter to the recording secretaries of the several chapters:

*To the Secretaries of the Several Chapters of the Society of Sigma Xi:*

In the June (1914) number of the *QUARTERLY* appeared an editorial entitled "Taking Inventory", bringing up questions as to policy, by-laws, and procedure in the several chapters. It is desired to make an investigation of these questions, and to publish a summary of results in an early number of the *QUARTERLY*—in the December number if possible. CHAPTER NAMES WILL NOT, OF COURSE, BE USED IN PUBLICATION.

The undersigned asks your co-operation in making this informal "Inventory" as complete and accurate as possible, and to that end would ask you to answer, in such detail as your time and inclination permit, the following questions, the numbers of which correspond to the numbers of the items mentioned in the above editorial. It is requested that replies be mailed not later than November 15.

### QUESTIONS

- 1 a) On the average, how many lectures or "meetings for the discussion of scientific subjects" does your chapter have each year?
- b) How many of these lectures are open to the public?
- c) What chapter machinery, if any, has your chapter for arranging for such meetings? Give any information of interest in this connection.
- d) To what extent are the social possibilities of Sigma Xi emphasized in your chapter?
- 2 a) How many of each of the following classes have been elected to membership in your chapter during the past five years: undergraduates; graduate students; faculty; alumni of over five years' standing?
- b) What is the practice of your chapter in determining "promise of marked ability" in electing undergraduates? i. e., do you require that an undergraduate shall have completed a piece of research; or shall have research work in progress; or is the estimate of "promise" based on general scholarship alone?
- c) Does your chapter have any similar requirement regarding graduate students, faculty, or alumni of five years' standing?

## 3 From the following list of titles make two groups:

Group A: Those subjects, represented in your University which your chapter recognizes in electing new members.

Group B: Those subjects, represented in your University which your chapter does not recognize in electing new members.

Subjects may be listed by number. Make any additions to your groups that seem to you pertinent:

- |                         |  |
|-------------------------|--|
| 1. Psychology           | 13. Geology and Physical Geography                                     |
| 2. Mathematics          | 14. Mechanical Engineering   |
| 3. Astronomy            | 15. Electrical Engineering   |
| 4. Physics              | 16. Civil Engineering  |
| 5. Chemistry            | 17. Ceramics   |
| 6. Botany               | 18. Architecture   |
| 7. Biology              | 19. Agriculture, and its branches                                      |
| 8. Entomology           | 20. Scientific Business Management                                     |
| 9. Nature Study         | 21. Market Conditions of Commodities (agricultural, engineering, etc.) |
| 10. Zoology             | 22. Domestic Science.  |
| 11. Medical Sciences    |  |
| 12. Veterinary Sciences |  |

- 4 a) What is the procedure in your chapter in regard to nominating, examining qualifications of, and electing new members? (A copy of your by-laws will probably be an answer to this question. If you cannot forward a copy, please give the steps in such detail as is necessary to make the procedure clear.)
- b) What is the average date of your annual election of new members?
- c) What is the nature of your initiation ceremony?
- 5 a) Are there any special details of organization or maintenance in your chapter which you think might interest other chapters?
- b) What are the annual dues in your chapter? Do you have an initiation fee?
- 6 a) What means—if any—are being taken in your chapter to keep in touch with your non-resident members, particularly those who have no opportunity to affiliate with other chapters? Has your chapter ever considered the question?

To date (November 23) replies have been received from the secretaries of fifteen of the twenty-eight chapters (including my own), viz: Cornell, Rensselaer, Union, Kansas, Yale, Brown, Columbia, Chicago, Michigan, Purdue, Case, Colorado, Wisconsin, Washington State, and Washington University. Grateful acknowledgement is made to the secretaries of the above chapters, whose co-operation has made possible the compilation of the material given below.

It is to be regretted that replies from the remaining thirteen chapters could not have been obtained, so that the results could have



had at least the semblance of completeness. It does not seem desirable, however, to delay reporting a summary of results. Further, on account of the unofficial nature of the inquiry, the writer did not feel justified in pressing a request for replies from those who did not report.

A few general remarks might be made regarding the questions. The writer, as recording secretary of the Cornell Chapter, was interested in how things were done in other chapters. What are the chapter activities? What chapter machinery is employed to accomplish certain results? Are there some special details of organization in some chapter that other chapters might do well to copy or at least profit by? In short, what mutual benefit can result from, and to what extent can fraternal relations among chapters be fostered by, an investigation of each other's methods. The several chapter reports that have from time to time appeared in the pages of the *QUARTERLY* have cleared up some questions in this direction; and raised others.

The list of questions in the above circular letter was intended to be representative—not exhaustive. It was the aim of the inquiry to point out the kind of information that would be mutually helpful to our several chapters in securing uniformity in practice in regard to a number of matters more or less general—rather than local—in scope.

Further, it is hoped to point out—shall we say inductively—the possibilities of the *QUARTERLY* as a means of promoting inter-chapter relations. Heretofore, the annual convention was practically the only medium for providing communications among chapters. And, vital as the convention is to our Society, the inspiration to be derived from mutual contact was felt only by the few: the delegates. Now, every active member can obtain from the *QUARTERLY* first hand information about the affairs of the Society and of the several chapters. If we will all use its pages freely and without reserve, and ponder carefully over what we find therein, a larger interest in Sigma Xi is bound to result. On the contrary, if the rank and file of the active membership is active in name only, the mightiest efforts of the few can avail but little.

We perhaps do not realize the extent of the revolution which is going on in the field of investigation. The center of activity in research is slowly, but none the less surely, being shifted from educational institutions to commercial centers. One needs only look at the authors of papers presented at any of the meetings of scientific societies or better to take a trip through the laboratory of any large

commercial organization, to realize the force of this statement. This is true not only in the prosecution of research, but in the training of investigators, as well. If Sigma Xi is to maintain its former place in the field of investigation we must face this fact and act accordingly. *We cannot, indefinitely confine our active membership to residents of educational institutions.* But more of this later.

The following is a summary of the answers to the above questions:

#### I. *a, b, c.* SCIENTIFIC MEETINGS

On the average, it appears that each chapter holds, annually, five "meetings for the discussion of scientific subjects," although there are wide differences among individual chapters. One chapter meets on "the third Thursday of each month from October to June". Three other chapters appear to hold monthly meetings, although not at regular intervals. If this average is maintained throughout the Society, it is seen that Sigma Xi is holding annually 140 meetings of a scientific nature—no mean accomplishment in itself.

About half of these meetings (33 out of 70) are open to the general public, although here again there is difference in practice among chapters. Six chapters (totaling 23 meetings) report that all their meetings are open to the public. Two chapters do not admit the public at all. Two others send special invitation cards to friends of members. The other chapters open part of their meetings to the public.

Two chapters report the excellent practice of collaborating with neighboring chapters in securing a circuit lecturer of national reputation to deliver at each chapter in the circuit a series of two or three public lectures on some scientific subject.

The duty of arranging for scientific meetings seems to rest largely with the officers of the chapter, although four chapters have a special elective committee of three or more members, which co-operates with the president or other officers in securing speakers, who it appears are in the main, active members of the chapter. Two chapters report that meetings are usually departmental in character: "A certain department or group of men in that department are asked to furnish the program for the evening."

Another chapter has such an excellent arrangement in this connection that it seems worth while to quote verbatim: "There is a committee on 'Ways and Means' which arranges a place for the meeting each month \* \* \* \* \* They also divide the chapter into groups \* \* \* \* \* each group being hosts to the chapter

for one night. This group provides the refreshments (which are always served) and has general charge of the social part of the meeting \* \* \* \* \* There is a committee on program which provides a speaker for each meeting. This committee consists of two members, with the secretary as member *ex-officio*." The effectiveness of this scheme in dividing the work among the various members, and thereby in securing general interest in the chapter as a whole can hardly be overestimated.

#### I. d. SOCIAL ACTIVITIES

In the main, social activities appear to be limited to an "after-meeting" following the lecture, an annual banquet (usually held on the occasion of initiation of new members), or both. Only one chapter reports no social activities. Another reports one social meeting yearly.

These "after meetings" are described as "very effective in promoting friendships among the members and in making new members acquainted with the people of the University interested in science"; or as "a small spread" consisting of "crackers, cheese, punch, pipes and tobacco"; a "buffet lunch and cigars", or "a dinner, or at least substantial refreshments and a reception connected with each meeting".

#### 2. a, b, c. ELECTION OF NEW MEMBERS

Statistics regarding the number and classification of members elected during the past five years could of course have been obtained in greater completeness from the secretary of the Society. Statistics, however, were desired on the basis of chapters reporting.

Taking the totals for fourteen of fifteen chapters reporting, 1,906 new members were elected during the past five years (including one chapter which had held only four elections). These were distributed among the several classes of members as follows:

Undergraduates	45 per cent.
Graduate students	40.5 per cent.
Faculty members	10 per cent.
Alumni	4.5 per cent.

For the Society as a whole, this appears to be about the usual proportions. For example, according to the table of membership statistics (QUARTERLY, I:27) the distribution of members elected in 1912 was as follows:

Undergraduates	49 per cent.
Graduates	38 per cent.
Faculty	13 per cent.
Alumni	0 per cent.

While of the 7,609 members elected, since the founding of the Society to the end of 1912, the distribution is

Undergraduates	46 per cent.
Graduate students	30.5 per cent.
Faculty	19 per cent.
Alumni	4.5 per cent.

Very approximately then, it appears that on the average of the newly elected members, the undergraduates comprise somewhat less than half, say 45 per cent.; graduate students make up a smaller proportion, about 35 per cent.; of faculty members there are about 15 per cent.; and of alumni of over 5 years there are less than 5 per cent.

These averages however tell us very little about the practices of the individual chapters in the matter of electing undergraduates and graduate students. An examination of the table of statistics above mentioned shows that we can divide the chapters, roughly, into three groups: (1) those electing few, if any, seniors; (2) those electing approximately equal numbers of seniors and graduates; and (3) those electing very few graduates.

	Number of chapters	Undergraduates elected	Graduates elected
Group 1	7	6	87
Group 2	11	182	157
Group 3	10	162	20

Group (3) comprises those chapters at institutions where there are not large graduate departments. Of the 7 chapters in group (1) four elected 68 graduate students and *no seniors*, although they were all institutions with large undergraduate departments.

These differences are to be explained partly on the basis of different local conditions in the several chapters, and partly on the basis of differences in the interpretation of "promise of marked ability" required of seniors by Section 4 of Article 3 of the Constitution.

A summary of the answers to questions 2 *b* is rather difficult. There seems to be, however, a general tendency to determine whether a senior has "promise" by his class room work and his general attitude in regard to science, rather than by the actual prosecution of research work. One chapter, however, reports that undergraduates "are not admitted", and another states that "an election could be made only \* \* \* \* \* in case of a very brilliant piece of research being done by a senior". In most chapters research is preferred, but not necessarily required. Some representative answers to this question are as follows:

"Formerly 'promise' in an undergraduate was based by some members largely on scholarship, but in December 1913 the chapter defined this term to mean an undergraduate in the fourth year class who has shown marked ability in the prosecution of some piece of work, done either independently or as a collaborator, or who has shown evidence of originality in the solution of intricate problems and the power to do constructive work with experimental data \* \* \* \* \*".

"We do not require research. 'Promise of ability' is based both upon scholarship record and upon the general impression which the personality of the candidate has made as to his promise."

"\* \* \* \* \* has depended about equally upon scholarship and the ability of the student to do original work as evidenced in class room and laboratory."

"Promise of marked ability is based on general scholarship, preferably though not necessarily [accompanied by] actual research."

"This matter is treated differently in different departments."

Perhaps the following is the attitude of not a few with respect to the undertaking of research by seniors: "We do not require that an undergraduate shall complete a piece of research. In most departments no undergraduate is competent to even attempt or comprehend the meaning of a problem of research that should be dignified by that name. For example, what could a student (senior) in mathematics do in the line of research?"

"The estimate is based largely on scholarship except in the engineering school; there is no opportunity for undergraduate research work as part of the University course; so *general ability* and scientific interest are the main deciding factors."

"\* \* \* \* \* general scholarship and attitude toward work."

Yet one chapter which bases its estimate of promise as it states "*very rarely* on general scholarship. Research completed or in progress is generally required", has in the past five years elected *four* times as many seniors as graduates.

With regard to the requirements for graduate students (question 2 c) there seems to be much greater uniformity of practice. "Research completed or well along" seems to summarize the practice of most chapters. Two chapters require that graduates shall have published their research in a reputable journal. It is interesting to note that these two chapters have elected over four times as many seniors as graduate students during the past five years.

Similarly, for the faculty, "noteworthy achievement" seems to

be applied literally in the selection of new members. "Continued activity in research" or "published research of high character" are the more frequent terms used.

### 3. SUBJECTS RECOGNIZED BY THE SEVERAL CHAPTERS

The question has frequently arisen in every chapter: "Is this or that thesis a piece of scientific research, and does it entitle the author to an election to Sigma Xi". Some interesting facts developed in connection with the replies, but not as much light as desired was shed on the question of what constitutes science.

Results can best be summarized in the following form: (For the meaning of "Group A" and "Group B" see question 3.) The first column contains the name of the subject. The second column contains the number of chapters placing that subject under "Group A". The third column contains the number of chapters placing that subject under Group B.

	Group A	Group B
Psychology	8	3
Mathematics	3	0
Astronomy	3	0
Physics	3	0
Chemistry	3	0
Botany	1	0
Biology	1	0
Entomology	8	1 (?)
Nature Study	1	4
Zoology	0	0
Medical Sciences	9	1
Veterinary Sciences	2	3
Geology and Physical Geography	2	0
Mechanical Engineering	3	1 (?)
Electrical Engineering	3	1 (?)
Civil Engineering	3	1 (?)
Ceramics	0	4
Architecture	3	4
Agriculture	3	2
Scientific Business Management	1	4
Market Conditions of Commodities (agricultural, engineering, etc.)	1	4
Domestic Science	2	4
Forestry	3	0
Chemical Engineering	3	0
Mining Engineering	3	0
Dentistry	1	0



The question still persists: What are "those lines of work which it is the object of the Society to promote?"

4 a. PROCEDURE IN ELECTING NEW MEMBERS

An adequate summary of the answers to this question could be secured only by quoting verbatim each answer.

Article IV. of the constitution provides two methods for electing new members—(details of each method to be provided for in chapter by-laws?):

Method 1. Sec. 2. The election of members, when performed by the active membership as a body, shall be by ballot.

Sec. 3. When the election is according to Sec. 2 an affirmative vote of three-fourths of the active members present shall be necessary for election.

Method 2. Sec. 4. When the active membership of a chapter exceeds twenty-four, the election of new members may be accomplished in the following manner:

Nominations shall be made by active members in writing, presenting, together with the name of the nominee, full testimony of his eligibility, signed by the nominator and a seconder. Such written nominations shall be sent to the chapter's Recording Secretary and by him forwarded to the chapter's President, who shall be chairman ex-officio of a Board of Electors, of a membership fixed by the chapter, but which at no time shall be less than five in number. This Board shall be selected from the active members by ballot at the annual election of the chapter's officers; vacancies occurring thereafter to be filled by the Board itself. A unanimous vote of the above Board shall be necessary for election. (See Appendix IV.)

APPENDIX IV.

EXTRACTS FROM RECORDS, CONVENTION 1899

The following resolution was moved and carried: That this convention suggests to the several chapters that when the method of election is employed as provided for in the constitution, Article IV, section 4, as amended in 1899, the action of the Board of Electors be referred to the chapter for formal ratification.

On account of variation in chapter by-laws a classification of methods of election is not easy. Very approximately, however, it may be said that of the 15 chapters reporting, three follow method 1; three follow method 2, without ratification by chapter; two follow method 2, with ratification by chapter; and seven use a combination of methods 1 and 2.

It would be tedious to describe the several methods in sufficient detail to make them all clear. A few representative extracts from answers will suffice:

"Nominations are made in writing by active members. In case of alumni and graduates qualifications must accompany nominations. A special meeting is held to discuss qualifications of nominees. Election is held at another special meeting."

"The list of candidates for membership from the undergraduate student body shall be composed of all seniors who may have been granted special honors in at least one of the departments of Physics, Chemistry, Mathematics, Geology and Biology without regard to the college course pursued, or to the rank attained in the general average of their work: together with the highest fifth of the seniors in each of the following courses:

1. General Engineering, 2. Electrical Engineering, 3. Scientific and Latin Scientific—as determined by the records in the Registrar's office at the close of the final examination of the winter term of the senior year; together with such other members of the senior class as have shown marked ability in those lines of work which it is the object of this society to promote, as may be added to the list of a majority vote of the active members present. From the eligible list as thus determined there may be elected a number of members not to exceed one-fifth of the total number of students who will graduate in the Engineering, Scientific, and Latin-Scientific Course; also any post-graduate student, candidate in residence for the Master's degree, may be elected if the major part of his work is in Science, Engineering, or Mathematics."

"Nomination for membership shall be made by active members in writing on the prescribed blank, signed by a nominator and seconder from the department in which the student is working. Such written nominations shall be sent to the Recording Secretary and after receiving his signature shall be forwarded by him to the President, who shall be chairman, ex-officio, of a Board of Electors composed of six members, Electors selected by ballot, etc. Term two years. A unanimous vote of this Board of Electors shall be necessary for election."

"Each active member is furnished with a special nominating blank. This blank contains the following headings and the information must be complete: nominee's name, nominated under class a, b, c, or d (i. e., faculty, alumnus, graduate, or undergraduate) degrees received, publications, remarks, further endorsements.

These blanks are then examined very carefully by the council. Power of election rests with the council."

"There shall be a Committee on Nominations consisting of the President, the Vice President, the Recording Secretary, the Corresponding Secretary, and the Treasurer, and *ten* other active members, five of whom shall retire each year.

"Nominations of candidates for election to this Chapter shall be in writing, upon blank forms to be provided by the Recording Secretary for the purpose; they shall be accompanied by a full statement of the qualifications of the nominee for membership, the nature and character of his work, and such other information as may assist the Chapter in judging of his fitness for membership, or in discriminating among candidates; they shall be signed by all active members of the Chapter in good standing, joining in the nomination, and by these only; they shall be handed to the Recording Secretary at least three weeks previous to the meeting at which they are to be voted upon, and this meeting shall be held in the second term of each year. It shall be the duty of the Recording Secretary to mail to each active member of the Chapter in good standing, at least four weeks before the date appointed, a notice of such meeting and of the time limit of nominations. A complete list of all nominations so received shall be at once prepared by the Recording Secretary and sent, together with the names of the members of the Committee on Nominations, to each active member of the Chapter in good standing. Any such member possessing information of an objectionable nature concerning any candidate proposed for election, may communicate the same to any member of this Committee, which information shall be regarded as strictly confidential and for the use of the Committee only. The Secretary shall, in a note appended to the list, call special attention to this provision of the by-laws.

"The Committee on Nominations shall hold a special meeting for the revision of this list at least two weeks before the date set for the election of new members; it shall have power to strike from this list the names of any candidates at their discretion, provided that no change shall be made in the list which is not supported by at least a majority of the members of the Committee. A copy of this revised list shall then be mailed by the Recording Secretary to each active member in good standing at least five days before the date of the meeting at which such names are to be voted on. THE LIST OF NOMINATIONS SHALL BE REGARDED BY EACH MEMBER AS STRICTLY PRIVATE AND CONFIDENTIAL. IT SHALL BE THE DUTY OF THE OFFICERS TO REPORT

TO THE CHAPTER ANY VIOLATION OF ITS CONFIDENCE.

"Sec. 2. Before proceeding with the election of new members, at the meeting held for the purpose, opportunity shall be given for a full discussion of the qualifications of the candidates proposed by the Committee on Nominations. Ballots shall be prepared by the Recording Secretary on which shall appear the names of all candidates recommended by the Committee on Nominations, and no others. Each voter shall write the word "Yes" opposite the names of such candidates as appear on said list for whom he may wish to vote, but the number of names so indicated must not exceed the number prescribed by the Constitution in Article IV. If the number receiving the votes of three-fourths of the active members in good standing present at the meeting shall exceed the number of possible elections, the lists shall be reduced to the proper limit by striking off successively the names of candidates receiving the lowest number of votes. In case the number elected shall fall below the number of possible elections, additional balloting may be proceeded with until all vacancies are filled, or until, by a majority vote, the balloting shall cease."

#### 4 b. DATE OF ELECTION OF NEW MEMBERS

There seems to be a tendency to put the date of election of new members as late in the year as practicable so as to allow each prospective candidate as much time as possible to develop his "aptitude". In the case of seniors this is both an advantage and a disadvantage. The additional time for developing scientific aptitude is desirable, but if election is held too late the senior leaves the chapter after having attended only one meeting. He does not get sufficiently in touch with Sigma Xi to realize its existence as an organization.

Eight chapters hold the annual election after May first; four either in March or April; two chapters have three elections yearly; one has two elections.

One chapter elects faculty and alumni members in February, graduates and seniors June first.

#### 4 c. THE INITIATION CEREMONY

Practically all chapters report that the form prescribed in Article V of the Constitution is closely followed. Some chapters make much of the initiation ceremony. Others are less formal. In one chapter, "all marshals and officers wear caps and gowns and the entire affair is conducted in a very impressive and dignified manner". In another "members are in evening dress". Nearly all chapters report an annual dinner or banquet in connection with the initiation meeting. Several include a scientific address.

## 5 a. SPECIAL FEATURES

It appears that the modesty of the several secretaries precluded the possibility of reporting anything from their own chapter that they thought might be profitably copied by others. Most of the answers to this question were laconically "None". Attention might however be called to several matters included in answers to other questions.

Two chapters report that they find a large board of electors representing all departments advantageous in scrutinizing the qualifications of candidates.

In several chapters nominations of new members are customarily made by departments.

Several chapters issue a year book, containing the chapter officers, program for the coming year, a roll of active members, and other matters of local interest.

One secretary reports: "It all resolves itself into a lot of work for the Secretary-Treasurer."

Attention might be called to the fact that several chapters combine the offices of Secretary and Treasurer,—“to put a safety valve on expenditure,” as one Secretary says.

One chapter reports, in answer to this question "Expenses are met from initiation fees."

## 5 b. DUES

Six chapters have annual dues of one dollar. Two have two dollars and one has three dollars. The remainder report "annual assessments" when necessary.

Initiation fees vary from two to five dollars, two dollars being most common; although five chapters report five dollars.

## 6. THE ALUMNI MEMBERSHIP

With the exception of five chapters, the universal reply to this question is: "No means are being taken to keep in touch with our alumni membership. The question has never been considered". Abstracts of the replies of these five exceptions are as follows:

"Notice of the annual meeting and a summary of the year's work is sent to all alumni members. The general question is being considered."

"Alumni members receive the annual announcement and program. They may be enrolled as contributing members on payment of dues."

"Notices of meetings are sent nearby alumni and a campaign is being inaugurated to get in touch with members of other chapters, resident nearby."



"Notices are sent to nearby non-residents. The general question has never been considered."

"Alumni in town receive notices of chapter activities. Addresses of all alumni are kept and a special effort is being made to locate neighboring Sigma Xi men."

These five chapters possessed in 1912 a total alumni membership of approximately 600. The total alumni membership of all the fifteen chapters reporting was about 3,600 in 1912. It therefore appears that only about one-sixth of our alumni members ever hear anything about the Society in anything like an official manner. In 1912 the alumni members of all chapters numbered approximately 6,000; the active members numbered about 2,200; making 8,200 in all. Apparently therefore only about 3,200 of our members (1,000 alumni and 2,200 active) are reached by Society and chapter activities. There are "adrift" throughout the country at least 5,000 members who are cut loose from the Society absolutely.

Some of these are in educational institutions where participation in the activities of research is possible, but where there is no chapter of Sigma Xi. A larger proportion are doubtless allied with industrial interests where they are directly or indirectly concerned in science, pure and applied. In fact it is probable that only a few of these 5,000 members are *not* interested, more or less, in scientific research.

When we consider what I fully believe to be true that the time is coming, if indeed it is not already here, when in certain lines of research at least, activities in industrial centers will predominate, we must, if Sigma Xi is to maintain its present stand in relation to research, grant a larger and more tangible recognition to the large body of our members whose interests are allied with commercial enterprise. This condition is not to be decried. On the contrary, its significance cannot be overestimated. It is most eloquent testimony to the fact that research has "made good". We as members of Sigma Xi, should all rejoice that the ideals for which we, as a Society, stand have been so generally recognized. And just as the importance of research to the world at large has grown, so have our responsibilities and opportunities connected therewith become greater. The question is one which deserves the careful consideration both of the Society as a whole and of the chapters individually.

Two things are at once obvious. First, an effort should be made to put the *QUARTERLY* into the hands of as many of these alumni members as possible. And second, chapters should be encouraged to keep in touch with nearby alumni members, whether of their own chapter or not.



## PROPOSED REVISION OF THE CONSTITUTION

These amendments were proposed by a committee consisting of President Cattell, Past-Presidents Williams, Nichols, Williston, Howe, and Eddy, Professors Stieglitz (Chairman of the Council), and F. R. Watson. The printed copy of the Constitution to which the proposed amendments refer is found in the Proceedings of the Thirteenth Convention on page 16, etc. It is reprinted exactly in the Quarter Century Record and History on pages 45 to 55. The Society has adopted no amendments since that date.

### ARTICLE I

#### NAME AND OBJECT

Sec. 2 shall be made to read:

The object of the Society shall be to encourage original investigation in science, pure and applied, by scientific meetings and addresses; by publications of scientific matter; by establishing fraternal relations among investigators; by election to membership as a recognition of scientific achievement.

### ARTICLE II

#### CHAPTERS

Sec. 1 shall read:

Chapters may be established at any educational institution at which scientific research work is cultivated and promoted.

Sec. 2 shall read:

Alumni chapters may be established at any place other than an educational institution, wherever the objects of the Society would be furthered.

Sec. 3 shall read:

A petition for a charter for the establishment of a new chapter shall be communicated to the President of the Society, who shall refer it to the Executive Committee of the Society for consideration and report to the (next) convention with its recommendation. A charter shall be granted by a three-fourths vote of the convention.

Sec. 4 shall be deleted.

Sec. 5 shall read:

"Sec. 4. A charter for the establishment of a new charter shall be issued by the President immediately after the convention, granting

it in the following form: To whom it may concern, etc., as in old Sec. 6.

Sec. 6 shall be incorporated in the new Sec. 4 as indicated.

Add the new Section 5:

The officers of each chapter shall be a president, a vice-president, a treasurer, and a secretary, each elected to serve two years.

Sec. 7 shall be deleted.

### ARTICLE III

#### MEMBERSHIP

The whole article shall read as follows:

Section 1. The Society shall consist of associate and active members.

Sec. 2. The following and no others are eligible to associate membership in a chapter in any institution:

(a) Any graduate student who has shown marked excellence in two or more departments of pure or applied science.

(b) Any undergraduate student who has completed all the required work of the first three years and who has shown marked excellence in two or more departments of pure or applied science.

Sec. 3. The following and no others are eligible to active membership in a chapter in any institution:

(a) Any professor or instructor of the institution who has shown noteworthy achievement as an original investigator in some branch of pure or applied science.

(b) Any investigator in pure or applied science who is not connected with an institution having a chapter of its own.

(c) Any graduate or undergraduate student who has proved his ability in scientific research by the performance of an original investigation of merit. (See the By-laws for the definition of original investigation of merit and for the rules governing nominations under this section.)

In the election of active members the following considerations concerning the meaning of the term "original investigation" should be followed: By original investigation shall be understood:

(a) Original work in pure or applied science suitable for publication.

(b) Original work of observation or experimentation in medicine that has been published.

(c) Original constructive work in engineering or architecture.

Sec. 4. Associate members shall have all the privileges of the active members except the right to vote, and only with such other restrictions as may be specifically stated in the Constitution or By-laws of the Society.

Sec. 5. Members of any chapter who may become connected with another institution at which there is a chapter shall be entitled to enrollment to the corresponding membership in the latter on presentation of satisfactory credentials.

Sec. 6. Alumni chapters shall be composed of such active and associate members as desire to be transferred to them from collegiate chapters and of such others as may be elected to membership in the Society by active members of the alumni chapters under the rules stated under Section 3 of this Article.

#### ARTICLE IV

##### ELECTION OF MEMBERS

Sec. 1 shall read:

Active and associate members of a chapter shall be elected by the active membership of such chapter in the manner to be hereinafter described.

Sec. 4, line 7, strike out the word "recording".

Sec. 5, strike out this section.

Sec. 6, strike out this section.

#### ARTICLE V

##### INITIATION

Substitute for Sections 1, 2, 3, and 4, the following:

Sec. 1. Each new member shall pledge himself to uphold the principles of the Society, shall affix his signature to the Constitution and receive a certificate, signed by the President and Secretary of the chapter, bearing the seal of the Society and reading as follows:

The Society of the Sigma Xi, etc., etc. (form as given in the old Sec. 4, but reading "membership or associate membership," according to the status of the new member).

#### ARTICLE VI

##### INSIGNIA

(See By-laws concerning associate members).

#### ARTICLE VII

##### OFFICERS OF THE SOCIETY

The entire Article shall read as follows:

Sec. 1. The officers of the Society shall be a president, a secretary, a treasurer, and an executive committee of seven members, of which the president and secretary shall be *ex-officio* members.

Sec. 2. The officers of the Society shall be elected at conventions for a term of two years, excepting that the elective members of the Executive Committee shall be elected for terms of five years, one member to retire each year.

Sec. 3. The duties of the executive officers and of the Executive Committee of the Society shall be those which usually pertain to the several offices. The Secretary shall hold and preserve all the papers of the Society.

## ARTICLE VIII

### CONVENTIONS

Sec. 1. A regular convention of the Society, consisting of delegates from each chapter, shall be held annually at such time and place as determined on by the Executive Committee of the Society, due notice being given to each chapter.

### DELEGATES

Sec. 2. (a) Each chapter in good standing shall be entitled to a representation of not more than three delegates at each convention.

Sec. 2. (b) and (c) stay as at present, (d) and (e) are transferred to the By-laws.

Sec. 3 on credentials is to be transferred to the By-laws.

### QUORUM

Sec. 5. The delegates from the chapters in good standing in the Society present at a duly called meeting shall constitute a quorum at a convention.

## ARTICLE IX

### EXPENSES

(To stand as at present.)

## ARTICLE X

### AMENDMENTS

Sec. 1. This Constitution may be altered or amended at a convention by a two-thirds vote of the chapters represented, provided such amendment has been proposed at the preceding convention.

## ARTICLE XI

### BY-LAWS

Sec. 1. Conventions shall make such by-laws not in conflict with this Constitution, as may be necessary for the proper government of the Society. Such by-laws shall become operative when confirmed by a majority vote of the chapters represented at a convention.

### *Appendix V*

Cancel the words "the Tuesday evening".

## BY-LAWS

### I. CONVENTION OF THE SOCIETY

1. At the conventions of the Society, the order of business shall be the following:

(a) Appointment by the President of three members to serve as a committee on credentials.

(b) Report of the committee on credentials.

(c) Reading of the proceedings of the last convention.

(d) Reports of officers.

(e) Reports from chapters.

(f) Reports of committees.

(g) General business.

(h) Election of officers.

(i) Adjournment.

2. The regular order of business at a convention may be suspended by the consent of three-fourths of the chapters represented.

3. The appointment of each delegate to a convention shall be certified to by the President or Secretary of the chapter appointing him.

4. The expenses of at least one of the delegates shall be paid in whole or in part by the chapter sending him, if his presence at the sessions of the convention have been certified to by the Secretary of the Society.

5. The convention may designate an assistant secretary to keep the minutes of the meeting.

## II. OFFICERS OF THE SOCIETY

1. The terms of the officers of the Society shall begin immediately after their election and continue for two years, or until their successors are elected. In case of vacancies, the executive committee shall designate officers to act until the next meeting of a convention.

2. It shall be the duty of the executive committee to consider and make recommendations on the granting of charters as provided for in Art. II, Sec. 3, on the basis of the following considerations:

In determining the award of a charter to an institution a close scrutiny should be given to the facilities and opportunities of the institution for the advancement and encouragement of original research in science, and to the qualifications of its scientific faculty to accomplish these ends.

## III. MEMBERSHIP

1. In the election of active members the candidate must be vouched for by two or more active members of the Society and the nature of the work done and the names of the vouchers shall be published in an official paper of the Society.

2. Associate members shall be entitled only to wear the emblem of the Society as a small pin.

## CHAPTER REPORTS

### THE CHICAGO CHAPTER

The regular autumn quarter meeting of the Society was held at the Quadrangle Club on December 1, 1913, when the address of the evening was given by Professor Jacques Loeb, of the Rockefeller Institute for Medical Research, who spoke on Recent Experiments on Artificial Parthenogenesis. At the winter quarter meeting on March 11, 1914, Professor Samuel W. Williston, of the University of Chicago, addressed the Society on Recent Discoveries Relative to the Early Land Life of North America. The spring quarter meeting on May 19, 1914, was a dinner in the Hutchinson Commons, following which Dr. Ira Remsen, President Emeritus of Johns Hopkins University, spoke upon Reminiscences of Sylvester and Rowland.

During the year the following graduate students were initiated into the Chapter:

Harold S. Adams, A.B., Williams 1911. Fellow in Chemistry.

Research: Overvoltage.

William Harley Barber, S.B., Wisconsin 1901; A. M., *Ibid.* 1909. Professor of Physics, Ripon College.

Research: The Nature of the Ionization Produced by  $\alpha$  Particles.

Bernard Brown, A.B., Peabody College 1903.

Research: A Maximal Property of the Flow of Viscous Liquids Through Tubes.

George T. Caldwell, A.E., Ohio State 1910; A.M., *Ibid.* 1913. Research Assistant in Pathology.

Research: Chemistry of Tuberculosis; Inhibition of Autolysis by Alcohol.

Charles Carlyle Colby, Ph.B., Michigan State Normal College 1906; S.B., Chicago 1909. Professor of Geography, State Normal School, Winona, Minn.

Research: Geography of Minnesota; Geography of the Driftless Area of Minnesota.

Richard Adolphus Conkling, A.B., Oklahoma. Fellow in Geology.

Research: Investigations on Petroleum in Venezuela.

Karl Kelchner Darrow, S.B., Chicago 1911. Fellow in Physics.

Research: Ratio of Specific Heats of Hydrogen at Low Temperatures.

Howard de Forest, S.B., Princeton 1895; M.F., Yale 1911.

Research: An Analysis of Forestry; The Scope of Dendrology.



Mary Louise Foster, A.B., Smith 1891; A.M., *Ibid.* 1912. Instructor, Smith College.

Research: Biochemical Activity of *Bacillus lactis erythrogenes*; Metabolism of *Pneumococcus*, etc.; Quantitative Determination of Indol and Skatol.

Meyer G. Gaba, S.B., Chicago 1907; S.M., *Ibid.* 1908. Instructor in Mathematics, Dartmouth, 1911-13.

Research: A Set of Postulates for General Projective Geometry in Dimensions.

Minnie Ryder Getman, A.B., Mount Holyoke 1904; Ph.B., State Normal College, Albany, 1905. Teacher of Botany, Lake Erie College, Painesville, Ohio.

Research: The Development of the Thallus and Conceptacles of *Hormeseria*.

Wilby T. Gooch, S.B., Bayler University 1906; S. M., *Ibid.*

Research: The Velocity of Saponification of Esters.

Kenneth Hallock, A.B., Hamilton 1910.

Research: Glands of Internal Secretion; Action of Bitters on Stomach.

James Harold Hance, S.B., Northwestern 1901; Washington 1908; E.M., Washington 1911. Assistant Geologist, U. S. Geological Survey.

Research: U. S. Geological Survey publications; Glendine Lignite Field; Potash in Western Salines; Coaldale Coal Field, Nev.; Clay Occurrence and Industry.

William L. Hart, S.B., Chicago; S.M., *Ibid.* 1914. Fellow in Mathematics.

Research: Trigonometric Series; Solution of Equations by Methods of Successive Approximations; Theorem in Differential Equations.

Olive Clio Hazlett, A.B., Radcliffe 1912.

Research: Invariantive Characterization of Linear Associative Algebras in a Small Number of Units; Classification and Invariantive Characterization of Nilpotent Algebras.

Lewis V. Heilbrum, A.B., Cornell 1911. Assistant in Zoology.

Research: Studies in Artificial Parthenogenesis.

John Martin Herald, A.B., Oklahoma 1912. Fellow in Geology.

Research: Oil and Gas in Chehalis and Jefferson Counties, Washington.

Andrew Henderson Hutchinson, A.B., McMasters 1909; A.M., *Ibid.* 1913. Fellow in Botany.

Research: The Male Gametophyte of Abies.

Julian H. Lewis, A.B., Illinois 1911; A.M., *Ibid.* 1912. Fellow in Pathology.

Research: Absorption of Proteins in Relation to Anaphylactic Shock.

Leonard B. Loeb, S.B., Chicago 1912.

Research: The Mobility of Ions in High Fields.

Bertha Martin, A.B., Mount Holyoke 1909.

Research: Development of Teeth in the Nine-banded Armadillo.

Carl Danforth Miller, S.B., Richmond College, Va. Fellow in Physics.

Research: The Energy of Emission of  $\beta$  Particles liberated by Characteristic X Rays.

Wandell Zerbe Miller, S.B., Ohio Wesleyan 1912.

Research: Experimental Investigation on the Development of Mountain Structure.

Frederick Byron Plummer, S.B., Dartmouth 1909. Fellow in Geology.

Research: Geology of the White Mountains.

Terence Thomas Quirke, E.M., North Dakota 1912; S.M., *Ibid.* 1913. Fellow in Geology.

Research: Geology of the Kildeer Mountains, N. D.; Geology of Rocque Island; On Economic Uses of Coal Clays.

Mabel Lewis Roe, A.B., Vassar 1903.

Research: The Development and Relationship of Splachnidium.

Wilmer Henry Souder, A.B., Indiana 1910; A.M., *Ibid.* 1911. Fellow in Physics.

Research: (With A. L. Foley) A New Method of Photographing Sound Waves; Photo Electric Effect.

Isabel Seymour Smith, A.B., Oberlin 1901; S.M., Chicago 1905. Professor of Biology, Illinois College.

Research: Nutrition of the Egg in Zamia.

Bert Allen Stagner, S.B., Missouri 1909; A.M., *Ibid.* 1910.

Research: The Molecular Rearrangement of Triarylmethylhydroxylamine.

V. O. Tansey, S.B., Chicago 1913.

Research: Origin of Pyrite and Marcasite in Coal and Associated Sediments.

Helen Tredway, A.B., Bryn Mawr 1911. Fellow in Chemistry.

Research: Thermal Decomposition of Hydrazines.

Mary Evelyn Wells, A.B., Mount Holyoke 1904; S.M., Chicago 1907. Fellow in Mathematics.

Research: Determination of Schwarz Relations in the Theory of Linear Integral Equations.

Stephen Sargent Visser, S.B., Chicago 1909; M.S., South Dakota 1910; M. A., *Ibid.* 1912. Fellow in Geography.

Research: The Geography of South Central South Dakota.

Clyde Wayland White, A.B., Ohio State 1910.

Research: Brownian Movements in Different Gases at Low Pressures.

Walter Tichnor Whitney, S.B., Pomona College 1910; S.M., *Ibid.* 1912.

Research: The Accurate Determination of the Color Curve of a Littrow Spectrograph Objective; Study of the Solar Granulation; A Chromograph Recording Apparatus.

Forbes Bagley Wiley, A.B., Kalamazoo 1906, and Chicago 1906.

Professor of Mathematics, Dennison University.

Research: Finiteness of Modular Covariants with Cogredient Variables.

Chester Henry Yeaton, A.B., Bowdoin 1908; A.M., Harvard 1909.

Fellow in Mathematics.

Research: On the Projective Differential Geometry of Curved Surfaces.

The active membership of the chapter at the present time numbers 166.

ROLLIN T. CHAMBERLIN, *Secretary.*

### THE PURDUE CHAPTER

Three open meetings were held during the academic year as follows:

October 29, 1913, an address on New Facts About Molecules and Atoms, by Prof. R. A. Millikan, Associate Professor of Physics, Chicago University. The main points of the speaker may be given in abstract as follows:

1. Molecular motions in gases both translational and rotational were first described and discussed and some of the simplest arguments for the correctness of the pictures given were presented. These dealt with recent experiments on Brownian Movements and on the specific heats of monatomic and diatomic gases.

2. The number of molecules in a cubic centimeter of air was given and the process of accurately counting that number as well as that of precisely weighing a single molecule was briefly described and explained.

3. The inside of the atom was considered and the evidence presented to show that each atom contains a number of minute negatively electrified bodies called electrons, and that the process of "ionization" of a gas by X rays consists in detaching from a neutral atom or molecule one single electron.

4. Photographic evidence was presented to show that an atomic system is so loose a structure that one atom when endowed

with sufficient speed may pass in a straight line through millions of other atoms without doing anything more than here and there to detach an electron from an occasional atom.

5. Evidence was presented to show that in the solid state the atoms have definite positions of equilibrium about which they oscillate with definite and measurable periods. Thus is solved the century-long riddle as to the significance of Dulong and Pettit's law.

January 7, 1914, an address on The Work of the Veterinary Department in the Control of Hog Cholera, by Dr. R. A. Craig, Professor of Veterinary Science, Purdue University.

Dr. Craig reviewed the history of the disease in this country and the work which had been done on hog cholera problems by the Bureau of Animal Industry of the U. S. Department of Agriculture, and the various state experiment stations. He showed the extent of the financial loss to Indiana from this disease during the past eighteen years and sketched the early efforts of control by isolation, sanitation, modification of rations, etc. The speaker then discussed the origin and development of the serum treatment at the Purdue University Experiment Station, described the various processes in the production of anti-hog cholera serum, and showed the extent and the results of the serum treatment in the protection of herds in Indiana.

April 24, 1914, an address on The Ice Age in the Rocky Mountains, by Dean Edward Orton, Ohio State University.

The lecture was illustrated by lantern slides and was well attended. Dean Orton's extensive travel and well-known ability as a geologist together with the exceptionally fine views which he presented, made his address greatly appreciated.

#### ELECTION OF NEW MEMBERS

The following named persons were elected to membership at a business meeting of the Chapter on May 20, 1914. Those elected from the faculty were elected on the basis of their achievement in research; undergraduate students were elected on the basis of their promise of ability and achievement in the field of research.

#### FACULTY ELECTIONS

Otto Custer Berry, A.B., University of Michigan, 1905; B.S. in M.E., University of Michigan, 1906; M.E., University of Wisconsin, 1910. Instructor in Engineering laboratory.

Research: T<sub>1</sub>r-Forming Temperatures of American Coals. Bulletin, University of Wisconsin, 1914.

Louis E. Endsley, B.S. in M.E., Purdue University, 1901; M.E., Purdue University, 1903. Professor of Railway Mechanical Engineering.

Research: Some Experiments with Freight Car Trucks. Pamphlets Nos. 1 and 2, Published by the American Steel Foundries, 1911, 1912. Papers on Superheated Steam. Proc. Railway Master Mechanics Assn. for 1910, 1911, 1912, 1913.

Curtis M. Hilliard, A.B., Dartmouth College, 1909; Graduate student, Mass. Institute of Technology, 1909-10; Assistant in Bacteriology and Physiology, College of City of New York, 1910-12. Assistant Professor of Sanitary Science.

Research: A Statistical Study of the Streptococci from Milk and from the Human Throat. Jour. Infectious Diseases, 41:144-164. A study of the Streptococci of the Throat. Jour. Infectious Diseases of Children, 3:287-293. Hypochlorite Treatment of Water. Proc. N. Y. Medical Assn., 1912. Further Studies in the Hypochlorite Treatment of Water. Ind. Engineering Soc., Jan. 1913. A Biometric Study of the Streptococci. Proc. Indiana Academy of Science, 1913, p. 155.

Alfred Still, Finsbury Technical College, London, 1886 to 1890. College de Dieppe, Paris. Assistant Professor of Electrical Engineering.

Research: Principles of Transformer Design. London Electrician, 1894. Armature Losses in Double-Current Generators. Electrical World, Aug. 12, 1905. Simple Diagrams for Three-Phase Power Calculations. Power, N. Y., Mar. 1906. The Theory of the Single-Phase Induction Motor. Electrical World, Dec. 8, 15, 22, 1906. Inductance of Electric Transmission Lines with Unsymmetrically Disposed Conductors. Electrical World, May 23, 1908. Flexible Supports for Overhead Transmission Lines. Electrical World, July 13, 1912. Commutation. Electrical World, July 20 and 27, 1914. Books: Alternating Currents of Electricity. Whittaker and Co., London, 1898; 2nd edition, 1914. Polyphase Currents. Whittaker & Co., London, 1906. Overhead Electric Power Transmission. McGraw Book Co.

UNDERGRADUATES (All graduated in June, 1914)

C. L. Ogle, Agriculture

F. E. Allison, Agriculture

DeMotte Clark Beach, Pharmacy  
 Merle Robert Meacham, Chemical Engineering  
 Francis Frazee Hamilton, Electrical Engineering  
 Horace W. Asire, Electrical Engineering  
 Herbert Allen Minturn, Mechanical Engineering  
 David Milton Yoder, Mechanical Engineering  
 Vincent Willard Young, Mechanical Engineering  
 John Wesley Ball, Civil Engineering

R. L. SACKETT, *Corresponding Secretary.*

### THE UNION CHAPTER

The Union Chapter has shown unusual vitality this past year owing to the attractive series of lectures arranged by the program committee. This has included addresses on The Glacial Period in Schenectady and Saratoga Quadrangles by Dr. J. L. Stoller; Lighting by Dr. E. J. Berg; Animals of the Ancient World by Mr. Langdon Gibson; Research by Dr. W. R. Whitney.

In March a joint meeting was held with the Phi Beta Kappa Society. At this meeting a paper was read by Dr. J. L. March on Rudyard Kipling.

The men who were elected into membership at the annual meeting were:

#### SENIORS

Morgan L. Williams	Honor Student
Warren C. Vosburg	Scientific Course
William A. Mudge	Scientific Course
John A. Hall	Electrical Engineering Course
Bert N. Hubbard	Electrical Engineering
Luther A. Hagar	Electrical Engineering
Walter C. Smith	Electrical Engineering
William G. Lutz	General Engineering

#### GRADUATE STUDENTS

Walter Von D. Tiedeman	Sanitary Engineering
Nicholas S. Diamant	Electrical Engineering

The seniors are chosen in the Union Chapter from those who have been granted special honors in Scientific courses and from those who have attained the highest rank in the Electrical and General Engineering courses or shown marked ability along scientific lines.

WARREN C. TAYLOR, *Secretary*



# CHAPTER OFFICERS LIST FURNISHED BY THE CORRESPONDING SECRETARIES OF THE CHAPTERS

CHAPTER	PRESIDENT	VICE-PRESIDENT	REC. SECRETARY	COR. SECRETARY	TREASURER
Cornell .....	A. W. Browne .....	J. G. Needham .....	F. K. Richtmyer .....	James McMahon .....	W. A. Riley .....
Rensselaer .....	E. D. N. Schulte .....	V. Godard .....	C. H. Andros .....	E. F. Chillman .....	E. F. Chillman .....
Union .....	Howard Opdyke .....	C. F. F. Garriss .....	Morland King .....	Warren C. Taylor .....	W. A. Garrison .....
Kansas .....	H. P. Cady .....	W. C. Stevens .....	P. V. Faragher .....	W. J. Baumgartner .....	W. H. Twenhofel .....
Yale .....	L. W. Bahney .....	L. L. Woodruff .....	R. L. Dickey .....	Joseph W. Roe .....	H. S. Palmer .....
Minnesota .....	Wm. E. Brooks .....	E. T. Bell .....	J. C. Sanderson .....	Fredk. K. Butters .....	Wm. H. Hunter .....
Nebraska .....	Sam'l Avey .....	G. A. Loveland .....	V. L. Hollister .....	L. B. Candy .....	L. B. Tuckerman .....
Ohio .....	Chas. B. Morrey .....	H. W. Kuhn .....	Freda Detmers .....	T. M. Hills .....	T. M. Hills .....
Pennsylvania .....	John M. Macfarlane .....	Eric Doolittle .....	Maurice J. Babb .....	W. H. F. Addison .....	J. P. Moore .....
Brown .....	Chas. W. Brown .....	H. E. Walter .....	R. G. D. Richardson .....	Harlan H. York .....	Philip H. Mitchell .....
Iowa .....	H. J. Prentiss .....	Robt. B. Wylie .....	A. D. Thomas .....	G. L. Houser .....	R. P. Baker .....
Stanford .....	V. L. Kellogg .....	L. L. Burlingame .....	Leroy Abrams .....	LeRoy Abrams .....	LeRoy Abrams .....
California .....	S. S. Maxwell .....	W. L. Jepson .....	R. S. Holway .....	Edmond O'Neill .....	A. C. Alvarez .....
Columbia .....	Charles P. Berkey .....	H. E. Hawkes .....	James K. Finch .....	J. H. Morecroft .....	James K. Finch .....
Chicago .....	R. A. Millikan .....	H. C. Cowles .....	R. T. Chamberlain .....	J. Stieglitz .....	R. T. Chamberlain .....
Michigan .....	Wm. C. Hoad .....	Ermine C. Case .....	Walter F. Hunt .....	Walter F. Hunt .....	Geo. R. LaRue .....
Illinois .....	W. S. Bayley .....	L. H. Smith .....	M. L. Enger .....	H. F. Moore .....	W. E. Joseph .....
Case .....	C. S. Howe .....	C. H. Fulton .....	W. J. Sweetser .....	W. J. Sweetser .....	C. D. Hodgman .....
Indiana .....	Mrs. C. Eigenmann .....	F. M. Andrews .....	M. E. Hubbard .....	J. J. Galloway .....	John B. Dutcher .....
Missouri .....	H. M. Reese .....	M. F. Miller .....	E. B. Branson .....	D. H. Dolley .....	Chas. W. Greene .....
Colorado .....	M. M. Ellis .....	L. W. Cole .....	P. G. Worcester .....	P. G. Worcester .....	Ira M. DeLong .....
Northwestern .....	C. B. Atwell .....	S. W. Ranson .....	H. S. Philbrick .....	W. L. Woodburn .....	Philip Fox .....
Syracuse .....	E. H. Archibald .....	R. A. Porter .....	H. A. Clark .....	H. A. Clark .....	F. F. Decker .....
Wisconsin .....	L. R. Jones .....	J. H. Walton .....	Walter J. Meek .....	R. H. Whitbeck .....	Oliver P. Watts .....
Washington State .....	F. A. Osborn .....	Minor Roberts .....	Effie I. Riatt .....	R. E. Rose .....	Geo. S. Wilson .....
Worcester .....	H. B. Smith .....	Frederic Bonnet .....	H. F. Stuart .....	R. K. Morley .....	A. S. Crandon .....
Purdue .....	Stanley Coulter .....	W. E. Stone .....	C. G. Woodbury .....	R. L. Sackett .....	R. G. Dukes .....
Washington Univ .....	Walter E. McCourt .....	R. J. Terry .....	J. C. Rayworth .....	Ernest L. Ohle .....	J. F. Abbott .....

Including Chapter Reports Received up to December 1, 1914

## OFFICIAL ANNOUNCEMENTS

A few extra copies are still to be had of the

### QUARTER CENTURY RECORD AND HISTORY

A copy will be sent prepaid on receipt of \$2.50. The Secretary is not authorized to vary these instructions given by the General Convention.

### PRINTED BLANKS

The General Convention has instructed the Secretary to keep for chapters a supply of printed blanks as enumerated below. According to instructions these are to be forwarded to chapters under the following stipulations:

Membership Certificates, stamped with the great seal of the Society. In packages of fifty prepaid, on advance payment of \$2.50 for each package.

Index Cards, on the condition that a duplicate set be sent for the general index of the Society maintained in the secretary's office. Gratis on demand.

Report Blanks, for submitting annual reports giving chapter officers, elections, and other statistical data. Gratis on demand.

### SIGMA XI PUBLICATIONS

It has been proposed to bind up a number of sets of important early documents regarding Sigma Xi and to place a set in each of a selected series of the leading libraries of this country.

The undersigned will be glad to receive copies of such publications relating to the Society in general or to any one of its chapters which those interested may be able and willing to furnish for this purpose.

There are now ten imperfect sets on hand; can you aid in completing them?

HENRY B. WARD.

